2018 Gleiberman Head and Neck Cancer Center Pilot Grant

Temporal Analysis of Metabolome in Head and Neck Cancer Patients Undergoing Treatment

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Scientific Abstract:

Improved radiation delivery techniques to treat Head and Neck squamous cell carcinomas (HNSCC), including intensity modulated radiation therapy (IMRT), have significantly improved acute and long term toxicity. However, high grade toxicity from treatment still occurs with mucositis being one of the most significant and common reasons for disruptions in treatment. Avoiding treatment breaks in HNSCC is critical, as it is associated with significantly worse outcomes and loco-regional control. It has been shown that the oral microbiota significantly changes during radiation therapy, but it has not been extensively studied during treatment and correlations with treatment toxicity and outcomes are limited. Our lab has generated preliminary data demonstrating that S. Pyogenes can differentially radiosensitize normal epithelial cells compared to lactobacillus reuteri. In this pilot study we will investigate the role of the microbiome on treatment toxicity in HNSCC patients undergoing radiation or chemoradiation. Our hypothesis is that specific Microbiota species present prior to or during treatment will correlate with development of high grade mucositis during radiation therapy. **In Specific Aim 1:** *we will determine the feasibility of collecting microbiome samples and metadata from 20 Head and Neck Cancer patients undergoing radiation or chemoradiation and perform 16S Seq and metabolomics*. **In Specific Aim 2:** we will determine *whether there a significant difference in relative intensity in a specific microbiota species between subjects with CTCAE 1-2 (low grade) mucositis and CTCAE 3-4 (high grade) mucositis.* This pilot data will be used in future studies to investigate the role of prophylaxis or microbiome modification in attempt to improve outcomes and quality of care for head and neck cancer patients.

Lay Abstract:

Radiation therapy has been used to successfully treat cancer for decades, and it remains one of the main pillars of cancer therapy. Radiation therapy works by delivering high doses of energy with pinpoint precision to kill cancer cells, and recent technological advancements have made it possible to deliver radiation therapy with millimeter accuracy while minimizing damage to surrounding tissues. However, patients undergoing radiation therapy continue to experience potentially detrimental side effects that can prevent the cancer therapy from being maximally effective. For example, one of the most common side effects that patients undergoing radiation therapy for head and neck cancers is mucositis, an infection of the mucosal surfaces of the mouth, throat, and other nearby areas. One of the reasons why this may occur is because radiation therapy can alter the microbiome

– the bacteria and other microorganisms that naturally occur – in areas hit with radiation. The project described here seeks to characterize the microbiome in the saliva, mouth, nose, and neck skin in patients undergoing radiation therapy to understand how it can affect a patient's recovery time, treatment plan, and risk of infection. Ultimately, armed with this information, physicians may be able to better predict and prevent infections to minimize the chance for interruptions in radiation treatment.